s18: EXP LOG (SLTN v311)
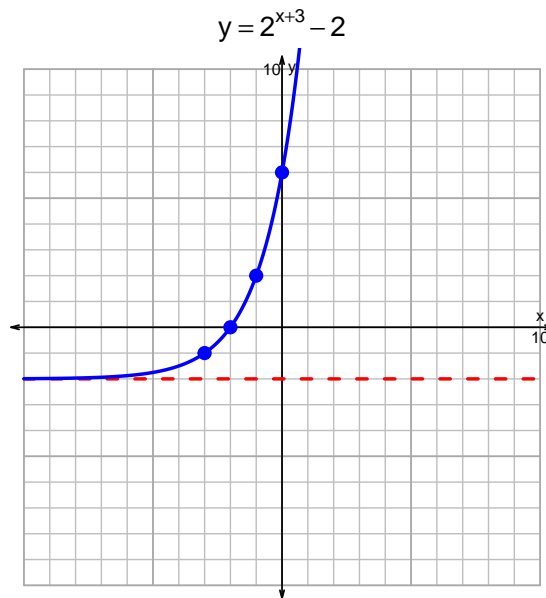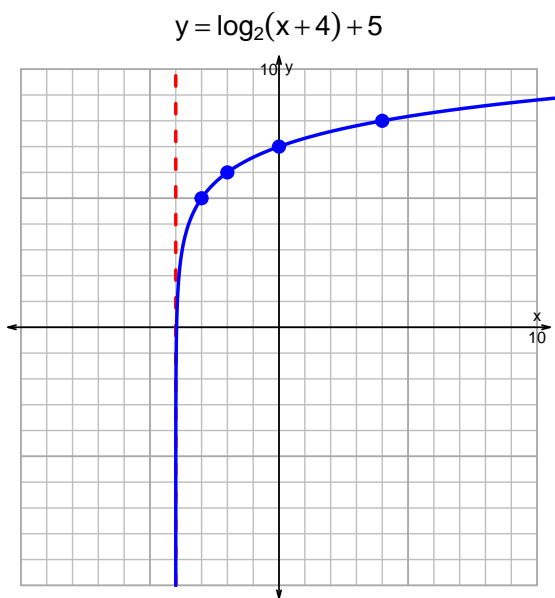
1. (10 pts) Graph $y = \log_2(x+4) + 5$ and $y = 2^{x+3} - 2$ on the grids below. Also, draw any asymptotes with dashed lines.

$$y = \log_2(x+4) + 5$$

$$y = 2^{x+3} - 2$$

Somewhat useful hint: $2^3 = 8$, *and thus* $\log_2(8) = 3$.

2. (10 pts) Write (but do not evaluate) the solution to the equation below by writing a logarithmic expression. Please do not do any arithmetic; just move numbers around.

$$-11 = \left(\frac{-5}{7}\right) \cdot 2^{-4t/3}$$

Divide both sides by $\frac{-5}{7}$.

$$\frac{11 \cdot 7}{5} = 2^{-4t/3}$$

Take log, base 2, of both sides.

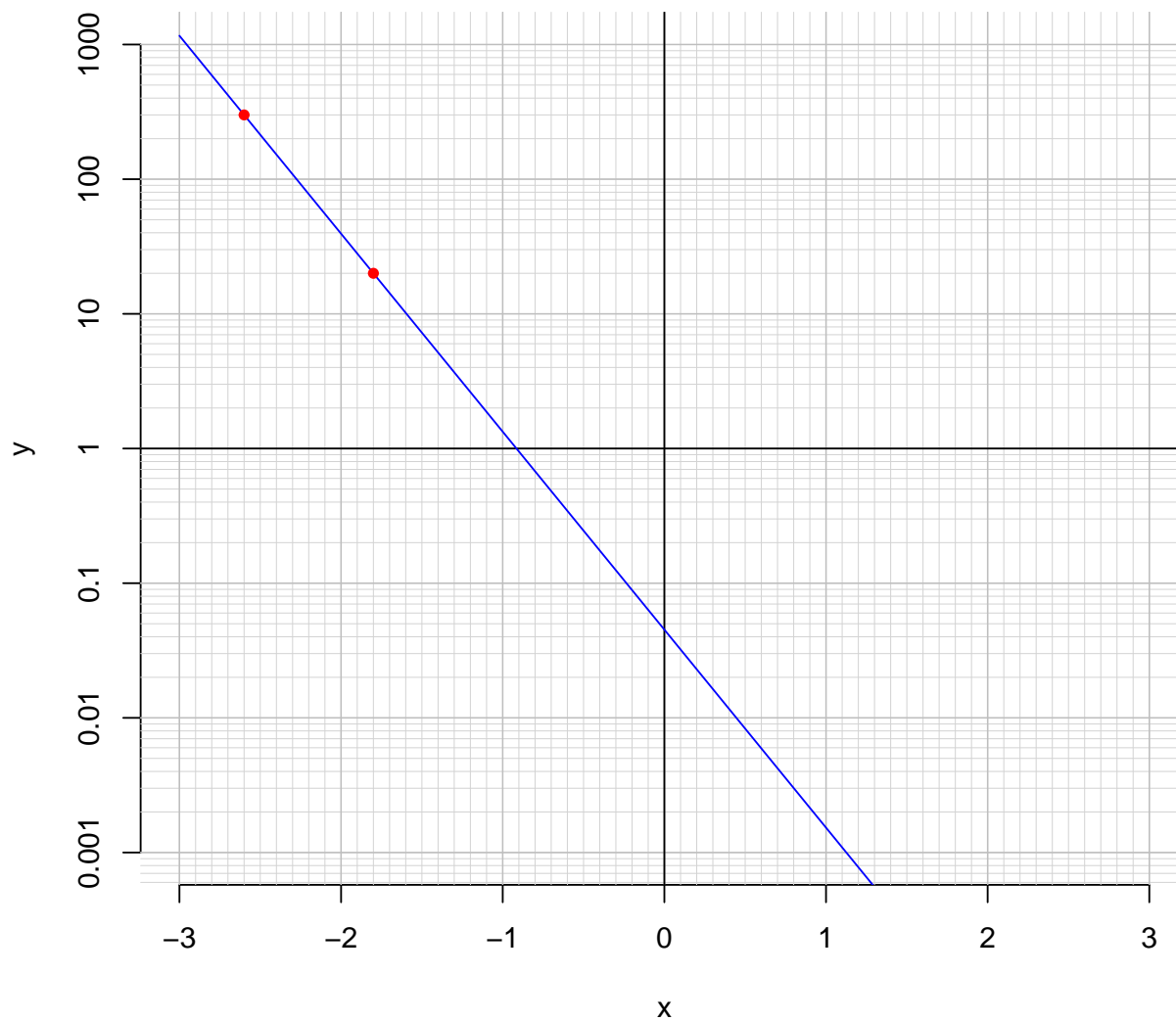$$\log_2\left(\frac{11 \cdot 7}{5}\right) = \frac{-4t}{3}$$

Divide both sides by $\frac{-4}{3}$.

$$\frac{-3}{4} \cdot \log_2\left(\frac{11 \cdot 7}{5}\right) = t$$

Switch sides.

$$t = \frac{-3}{4} \cdot \log_2\left(\frac{11 \cdot 7}{5}\right)$$

3. (10 pts) An exponential function $f(x) = 0.0452 \cdot e^{-3.39x}$ is graphed below on a semi-log plot.

a. Using the plot above, evaluate $f(-2.6)$.

$$f(-2.6) = 300$$

b. The inverse function is logarithmic.

$$f^{-1}(x) = \frac{-1}{3.39} \cdot \ln\left(\frac{x}{0.0452}\right)$$

Using the plot above, evaluate $f^{-1}(20)$.

$$f^{-1}(20) = -1.8$$